National Infrastructure Advisory Committee

Education and Workforce Preparation
and Research
Working Group Update
April 12, 2005

NIAC Education and Workforce Preparation Working Group

- The Study Group continues to gather data addressing 7 key areas:
  - Improve math and science competency of K-12 learners.
  - Identify incentives to attract students into technical fields, specifically information assurance and cyber security.
  - Enhance content and delivery of information assurance and cyber security curricula.
  - Enhance the usefulness and availability of cyber security certification programs
  - Enhance efficacy of CyberCorps program.
  - Enhance competitiveness of U.S. education internationally.
  - Enhance timeliness of security clearances

NIAC Education and Workforce Preparation Working Group (cont.)

- The Study Group has heard from a number of experts on the issues of Curricula, certification, encouraging underrepresented groups to study math and science, Cyber Corp scholarship program, and incentives to recruit and retain workers in the field.
- Some of the suggestions from the experts require changing the status quo. Challenges of doing so were also discussed.

Methodology

- The Study Group is looking for scalability in existing programs.
- The Study Group is looking for actionable, out of the box solutions that, if implemented, even in pilots, will move the game from talking to action.
- The Study Group, have learned about, and will draw attention to approaches that actually work, regardless of controversy.
- Recommendations will likely be applicable to more than one issue being studied.

Math and Science Competency for K-12

- Spoke with E. D. Hirsch, retired Education professor from University of Virginia and author about “process oriented” vs. “knowledge based” education.
- No consistency in education between localities or state.
- Discussed benefits & difficulties of developing Core Curriculum.

Math and Science Competency for K-12 (cont.)

- Spoke with John Yochalson, President of Best Engineering and Science Talent (BEST) on how to encourage underrepresented groups to enter field of math and science.
- Challenge in education, in general, no connectivity between K-12, and higher education.
- Found pockets of excellence within school programs, but nothing that was system wide.

Math and Science Competency for K-12 (cont.)

- Outreach to Department of Education.
- Department of Education representatives to present to the Study Group in April. Interested in available metrics and related studies.

Incentives to Attract Students

- Attracting students to technical fields
  - The Study Group continues to examine this issue.
  - Scholarships, such as those from the National Science Foundation.
  - Mentorship programs.
  - To encourage more PH.D, one expert suggests 5 year loans to students. When done with PH.D, for each year they work at a University, forgive a year of the loan.

Incentives to Attract Students (cont.)

- The Study Group is using contacts at SUNY Buffalo, which has an NSF grant to research this issue.
- Looking to speak to a Cyber Corp graduate(s) and get feedback on their experience as well as suggestions.

Cyber Security Curricula Development

- Dr. Blaine Burnham, a Senior Research Fellow, at the University of Nebraska Consortium on Information Assurance discussed how College Education needs to be less vocational, or training oriented, and more core theory.
- Educators in the field need more real world experience. Compared to ROTC, how officers rotate into ROTC teaching positions after having been in the field.
- Need to encourage those with the most knowledge to get in-front of a class. But pay in private industry is better than teaching.
- Need more PH.Ds.

Cyber Security Curricula Development (cont.)

- National Science Foundation's Federal Cyber Program Scholarship for Service Program (Cyber Corp) has a Capacity building track. Have provided $150,000 a year for two years, for curriculum and faculty development to qualifying educational institutions.

Efficacy of CyberCorps

- Dr. Diana Gant of the Federal Scholarship for Service Program in Information Assurance (Cyber Corp) discussed the program.
- Scholarship money goes to Universities that are Centers for Academic Excellence in Information Assurance Education (CAE/IAE). About $2.5 million, which funds 30 students for two years (tuition, room board, fees and stipends).
- 540 students have received scholarships.
- Challenges: lag in hiring process and security clearances for graduates.

International Competitiveness of US Education

- This is closely related to the K-12 question.
- Recommendations for K-12 will likely overlap.
- Study group scheduled to hear from a technology trade association regarding an industry view of this issue.

Certification programs

- Spoke with Hun Kim, Department of Homeland security. Government is looking to establish a consistent Information Security Certification Programs based on Common Body of Knowledge.
- Government does not want to be in business of certification, but would like to see nationally recognized, privately administrated certification programs.
- The Institute for Defense Analyses (IDA) also presented. Wrote a white paper for Dept of Defense (DOD) compared existing certification programs to DOD requirements.

Certification programs (cont'd)

- Found many existing programs fit DOD requirements.

Timeliness of Security Clearance Process

- The group is still collecting data on this issue. This is an issue for many.

Next Steps

- The Study Group continues to collect information.
- Is currently forming draft recommendations to address the 7 key areas.

National Infrastructure Advisory Committee

Workforce Preparation & Education - Research Working Group Update

April 12, 2005

NIAC Education and Workforce Preparation Working Group

- The Working Group continues to gather data addressing 4 key areas:
  - The need for a critical infrastructure protection and cyber security national research agenda.
  - The adequacy of the funding base for critical infrastructure protection and cyber security related research.
  - Research products "time-to-market" issues.
  - The adequacy of the related research national talent pool.

NIAC Education and Workforce Preparation Working Group (cont.)

- Considerable effort has been proceeding on a track parallel with the NIAC's interests:
  - The February 2005 report of the President's Information Technology Advisory Committee published by the National Coordination Office for Information Technology Research and Development.
  - The Computer Science and Telecommunications Board current study, *Improving Cyber Security Research in the United States.*

NIAC Education and Workforce Preparation Working Group (cont.)

- Considerable effort has been proceeding on a track parallel with the NIAC's interests:
  - The Interagency Research Council headed by Dr. Carl Landwher, National Science Foundation .
  - The Critical infrastructure Protection Working Group, chaired by Simon Szykman, Department of Homeland Security.
  - The National Security Agency and DHS Centers of Academic Excellence, Dr. Vic Maconachy, National INFOSEC Education and Training Program

Cyber Security: A Crisis of Prioritization, PITAC Report, 2/05

- Significantly increase support for fundamental research in civilian cyber security in 10 priority areas.
- Intensify Federal efforts to promote the recruitment and retention of cyber security researchers and students at research Universities.
- Increase support for the rapid transfer of Federally developed cyber security technologies to the private sector.
- Strengthen the coordination of Federal cyber security R&D activities.

1. Increase research in civilian cyber security in 10 priority areas

- The NSF budget in this area should increase by $90 million annually. Fundamental research at DHS and DARPA should also be increased.
  - In FY 2004, the Cyber Trust Program at NSF received 390 proposals and made 32 awards totaling $31 million. This success rate of 8 percent of the proposals (and 6 percent of requested funds) is a factor of three lower than the NSF-wide numbers. In scientific peer review, at least 25 percent of the proposals were judged worthy of support.

1. Increase research in civilian cyber security in 10 priority areas

- Authentication technologies
- Secure fundamental protocols
- Secure software engineering and software assurance
- Holistic system security
- Monitoring and detection
- Mitigation and recovery methodologies
- Cyber forensics: Catching criminals and deterring Criminal activities
- Modeling and test-beds for new technologies
- Metrics, benchmarks, and best practices
- Non-technology issues that can compromise cyber security

2. Double the size of the research community by 2010

- The Federal government should intensify its efforts to promote recruitment and retention of cyber security researchers and students at research Universities, with a goal of at least doubling the size of the civilian cyber security fundamental research community by the end of the decade.
- The Federal government should increase and stabilize the funding for fundamental research in civilian cyber security, and should support programs that enable researchers to move into cyber security research from other fields.

3. Strengthen the cyber security technology transfer partnership

- Specifically, the Federal Government should place greater emphasis on the development of metrics, models, datasets, and test-beds so that new products and best practices can be evaluated.
- Jointly sponsor with the private sector an annual interagency conference to showcase new cyber security R&D.
- Fund technology transfer efforts (in cooperation with industry) by researchers who have developed promising ideas or technologies.
- Encourage Federally supported graduate students and post doctoral researchers to gain experience in industry as researchers, interns, or consultants.

4. Focal point for coordinating Federal cyber security R&D efforts

- The Interagency Working Group on Critical Information Infrastructure Protection (IWG/CIIP) should become the focal point for coordinating Federal cyber security R&D efforts. This working group should be strengthened and integrated under the Networking and Information Technology Research and Development (NITRD) Program.

4. Focal point for coordinating Federal cyber security R&D efforts

- Current Federal Government cyber security R&D coordinating bodies:
  - Interagency Working Group on Critical Information Infrastructure Protection (IWG/CIIP), which is part of the National Science and Technology Council (NSTC)
  - Subcommittee on Networking and Information Technology Research and Development, which coordinates the NITRD Program and which is also part of the NSTC, and the Subcommitee's Coordinating Groups, especially the :
    - High Confidence Software and Systems Coordinating Group
    - Large Scale Networking Coordinating Group
  - Infosec Research Council

Improving Cyber Security Research in the United States, CSTB study

- This project will identify promising areas for cyber security research in an era in which networked information systems are becoming both critical and pervasive.
- It will address research topics traditionally associated with cyber security, as well as those related to improving the trustworthiness of networked information systems.

Improving Cyber Security Research in the United States, CSTB study

- Identified study topics:
  - Promising areas of cyber security research.
  - Observed needs - Increased levels of support for research.
  - Coordinating role for cyber security.
  - Increasing the size of the research community.
  - Allocation methodologies for researcher funding.
  - "Secure" network metrics.
  - Securing SCADA systems.
  - Identifying technical gaps in critical infrastructure network security.
  - Research priorities and resource requirements.

Next Steps

- Continue to track subject area studies to completion.
- Continue consultation with key experts.
- Develop and administer a survey of the NSA/DHS Academic Centers of Excellence Institutions, and Sector Coordinating Council (SCC) leaders to validate PITAC and CSTB findings and recommendations.
- Develop preliminary recommendations for July NIAC meeting.